REMARKS

The present response is intended to be fully responsive to all points raised by the Examiner in the Office Action and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

The application as examined includes claims 1 – 9, and 12 – 13. In the present response, claims 1, 3 – 6 are amended. Claim 2 is unchanged. Claims 7 – 9 and 12 – 13 are canceled without prejudice. Claims 10 – 11 were previously canceled. New claims 14 – 27 are added. Accordingly, claims 1 – 6 and 14 – 27 will remain pending in the application upon entry of this Amendment.

Support in the Specification for Claim Amendments and New Claims

Support for the amendments to the claims and the new claims is set forth herein, with reference to the application as filed and as published in International Publication No. WO 01/15028:

> The feature recited in amended claims 1 and 4 as "audio compact disc master" is disclosed in Figure 19 element **1945**, and from page 33 line 9 through page 34 line 2. In particular, page 33 lines 29 – 30 discloses recording "audio compact disc master **1945**".

> The claimed features recited in amended claim 1 as "locating a first C1 error-correction codeword associated with said data symbol", "locating a C2 error-correction codeword associated with said data symbol", and "locating a second C1 error-correction codeword associated with said at least one of a plurality of C2 Q-parity symbols in said C2 error-correction codeword" are disclosed in general in Figures 11 and 12, and from page 29 line 10 through page 30 line 13. Specific disclosures are also made, including the following: C1 P-parity symbols are disclosed in Figure 1 data structure **140-10**; Figure 11 data structure **140-10** data symbols S_{29}, S_{30}, S_{31}, and S_{32}; and Figure 12 data structure **1250** data symbols S_{29}, S_{30}, S_{31}, and S_{32}. C2 Q-parity symbols are disclosed in Figure 1 data structure **140-6**; Figure 11 data structure **140-6**

data symbols S_{13}, S_{14}, S_{15}, and S_{16}; and Figure 12 data structure **1245** data symbols S_{13}, S_{14}, S_{15}, and S_{16}; and data structure **1205-4** data symbols S_{13} **1260**, S_{14} **1265**, S_{15} **1270**, and S_{16} **1275**. A detailed example of locating C1 and C2 codewords for a specific data symbol is provided from page 29 line 25 through page 30 line 13, including the locating of a C1 codeword associated with a C2 codeword Q-parity symbol, on page 30 line 6.

The claimed features recited in amended claim 1 and new claims 17 and 27 as "a first disabled C1 error-correction codeword", "by altering at least one of a first plurality of C1 P-parity symbols in said first C1 error-correction codeword", "a disabled C2 error-correction codeword", "by altering at least one of a plurality of C2 Q-parity symbols in said C2 error-correction codeword", "a second disabled C1 error-correction codeword", and "by altering at least one of a second plurality of C1 P-parity symbols in said second C1 error-correction codeword" are disclosed *inter alia* in Figures 14, 15, and 16, steps **1445**, **1450**, and **1455**, and on page 25 lines 1 – 11, and on page 30 lines 14 – 22.

The claimed feature recited in amended claim 1 as "recording onto the master said erroneous symbol, said first disabled C1 error-correction codeword, said disabled C2 error-correction codeword, and said second disabled C1 error-correction codeword" is disclosed *inter alia* in Figure 19, master **1945** via recording laser **1935** receiving input from noise generator and codeword disabling unit **1930**, and on page 33 line 28 through page 34 line 2.

The claimed feature recited in amended claim 3 as "said erroneous symbol corresponds to a superimposed impulse to produce a latent noise" is disclosed *inter alia* in Figure 9 noise impulse **925**, and on page 32 lines 7 – 13.

The claimed feature recited in amended claim 5 and new claim 14 as "altering a parity symbol comprises overwriting said parity symbol with an

arbitrary erroneous symbol which is a valid Eight-to-Fourteen Modulation (EFM) symbol" is disclosed on page 26 lines 15 – 26.

The claimed feature recited in amended claim 6 and new claims 15 and 16 as "altering a parity symbol comprises creating an erasure by overwriting said parity symbol with an invalid symbol that does not correspond to any 8-bit value defined for Eight-to-Fourteen Modulation (EFM) encoding" is disclosed on page 25 lines 15 through 17 and lines 22 to 23.

The claimed features recited in new claim 14 as "at least two parity symbols in at least one of said disabled codewords are overwritten with arbitrary erroneous symbols", in new claim 15 as "altering at least two additional parity symbols in at least one of said disabled codewords by creating erasures therein by overwriting said at least two additional parity symbols in said at least one of said disabled codewords with invalid symbols", and in new claim 16 as "at least three parity symbols in at least one of said disabled codewords are altered by creating an erasure by overwriting said at least three parity symbols with invalid symbols" are disclosed on page 25 lines 1 – 11.

The claimed feature recited in new claim 25 as a copy-protected disc "molded from a disc master" and in new claim 27 as a "disc master for production of copy-protected discs" is disclosed on page 9 lines 8 – 10.

Objections

The specification stands objected to as failing to provide proper antecedent basis for the claimed subject matter in claim 1 regarding the limitation of "at the time of mastering said copy protected audio compact disc..." and in claim 7 regarding the limitation of "at least one uncorrectable erroneous data symbol produced when mastering the copy-protected compact disc". The Examiner asserts that there does not appear to be proper antecedent basis for these limitations in the specification as originally filed.

The Applicant overcomes the objection by canceling claim 7 and by amending claim 1 to recite "audio compact disc master". The antecedent basis for this feature appears in

the specification and drawings as originally filed, as cited above under the heading "Support in the Specification for Claim Amendments".

Claim 7 stands objected to because of the informality of ending with two periods. The Applicant cancels claim 7.

35 U.S.C. §101 Rejection

Claims 7 – 9 and 13 stand rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter. The Office Action asserts that:

> "Claims 7 – 9 and 13 are directed merely to arrangements of data, although stored on a compact disc. Specifically, independent Claim 7 does not recite any structure for the disc, but only discloses data symbols, at least one of which is erroneous, and that there are error correction codewords associated with the data symbols, potentially including erroneous parity symbols. This only requires an arrangement of data on the disc but no particular structure for the disc itself. The arrangement of data does not meet the definition of a data structure and is not computer code. An arrangement of data is non-functional descriptive material, which is not statutory subject matter even if stored on a computer-readable medium." (Office Action point 7, page 8)

Claims 7-9 and 13 are canceled. Applicant, however, adds new claims 17-27 directed to an article of manufacture. Applicant respectfully submits that a disc is an article of manufacture and therefore constitutes statutory subject matter under 35 U.S.C. § 101. Furthermore, independent claim 17 recites, in part, the disc comprising several elements having patentable subject matter including codewords. According to the MPEP section 2106.01, when program code is recited in conjunction with a physical structure, such as storage media, USPTO personnel should treat the claim as a product claim. As a result, independent claim 17 and its dependent claims are directed to statutory subject matter under 35 U.S.C. § 101. Thus, Applicant respectfully requests reconsideration and withdrawal of the § 101 rejection.

Moreover, Applicant respectfully disagrees with the assertion that the codewords and parity symbols thereof in an audio compact disc are merely arrangements of data. As is well-

known in the art, the codewords are constructed according to precise mathematical formulas of the Reed-Solomon coding convention. Thus, the codewords are understood and operate as computer instructions and individually and collectively constitute computer code since they direct the meaningful decoding of the data to result in error-resistant reproduction of the original audio data stream. Accordingly, the codewords and their parity symbols are functional, and their functionality can readily be seen by noting that the parity symbols computed by the Reed-Solomon formulas consist of *redundant* data which on its own *does not contribute any information into the audio data stream of the playback output*. Because the parity symbols carry and impart no additional audio information, they would not be included on the disc if they did not serve a useful function.

According to MPEP 2106.01:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, *"functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component.* (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) *"Nonfunctional descriptive material" includes but is not limited to music, literary works, and a compilation or mere arrangement of data.* (emphasis added)

The Applicant respectfully maintains that the codewords and parity symbols of an audio compact disc meet the above MPEP criteria for *functional* descriptive material, in that the codewords and their parity symbols classify as *data structures which impart functionality when employed as a computer component.* The functionality in this case is the detection and correction of data errors. Codewords and their parity symbols therefore have requisite functionality and thus satisfy the practical application requirement mentioned in MPEP 2106.01.

In contrast, even though "nonfunctional descriptive material" is not limited to music, literary works, and a compilation or mere arrangement of data, it is clear from the examples presented (music, literary works) that "nonfunctional descriptive material" is intended

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to cover various forms of creative expression for which protection is provided under the copyright law, as suggested by MPEP 2106.01. Codewords and parity symbols, being computed according to mathematical formulas, do not fit into this category.

Based on the above, Applicant respectfully maintains that the codewords and parity symbols recorded on an audio compact disc comprise statutory subject matter according to MPEP 2106.01, as being functional descriptive material. The claimed products according to new claims 17 – 27 have a physical structure which imparts a special functionality (copy-protection) and which, as discussed below, distinguishes them from the prior art.

35 U.S.C. §112 Rejection

Claims 1 – 9, 12, and 13 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The Office Action asserts that the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art, that the inventors, at the time the application was filed, had possession of the claimed invention.

Regarding the limitation of claim 1 recited as "at the time of mastering said copy-protected audio compact disc...", the Examiner notes that there does not appear to be sufficient written description for any particular step being performed "at the time of mastering" in the application as filed, and that there is no explicit mention of a mastering process or step in the disclosure.

Regarding the limitation of claim 7 recited as "at least one uncorrectable erroneous data symbol produced when mastering the copy-protected compact disc", the Examiner notes that there does not appear to be sufficient written description for producing symbols when "mastering".

The Applicant respectfully overcomes the §112 rejection of claims 1 and 7 by canceling claim 7 and amending claim 1 to recite the features "audio compact disc master" and "master". The present application as filed contains a disclosure of these features in the context of the present invention, using the terms recited in amended claim 1, as cited above under the heading "Support in the Specification for Claim Amendments".

Claims 7 – 9, 12, and 13 were also rejected under 35 U.S.C. §112, first paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention.

The Examiner notes that Claim 7 recites limitations such as "the audio signal" and "the data symbols representing at least one digital sample", without clear antecedent basis for these limitations in the claim.

Applicant cancels claims 7 – 9 and 12 – 13, and respectfully requests reconsideration and withdrawal of the section 112 rejection of claims 7 – 9 and 12 – 13.

35 U.S.C. §102(b) Rejection

Claims 1 – 9, 12, and 13 stand rejected under 35 U.S.C. §102(b), as being anticipated by U.S. Patent 6,425,098 to Sinquin, et al. ("Sinquin").

The Applicant respectfully traverses the above §102(b) rejection on the grounds that Sinquin fails to disclose or reasonably suggest at least the following features recited in amended claim 1:

> locating a first C1 error-correction codeword associated with said data symbol;
>
> producing a first disabled C1 error-correction codeword by altering at least one of a first plurality of C1 P-parity symbols in said first C1 error-correction codeword;
>
> locating a C2 error-correction codeword associated with said data symbol;
>
> producing a disabled C2 error-correction codeword by altering at least one of a plurality of C2 Q-parity symbols in said C2 error-correction codeword;
>
> locating a second C1 error-correction codeword associated with said at least one of a plurality of C2 Q-parity symbols in said C2 error-correction codeword;

producing a second disabled C1 error-correction codeword by altering at least one of a second plurality of C1 P-parity symbols in said second C1 error-correction codeword;

First, it is noted that Sinquin fails to disclose or reasonably suggest the existence of the Reed-Solomon error-correcting codewords corresponding to a data symbol. Sinquin discusses only the "frames" as they appear in sequence on the tracks of the recorded compact disc (e.g., Sinquin Figure 1, column 1 lines 38 – 47) and fails to describe or even mention how the symbols of a frame are delayed, interleaved, and grouped into C1 and C2 codewords for playback. Sinquin, in fact, admits to presenting only a superficial account of the data and error-correcting structure of a CD:

> [Sinquin column 9 lines 42 – 44] "In reality, *the relationship of the audio signals to the data recorded on the CD is far more complex*..." (emphasis added)

Indeed, during playback of a compact disc, the audio data stream is not simply played back from the frames as they appear sequentially on the track, but is assembled from an intricate grouping of interleaved, crossed, and delayed frames.

In contrast, the present application presents the Reed-Solomon cross-interleaving in detail. Starting with the frame as recorded on the compact disc (present application, Figure 1), and proceeding to the C1 and C2 interleave advance and cross-advance (Figure 2, Figure 11, and Figure 12). This prior art is necessary background for effective disabling of error correction according to the present invention. As is cited above under the heading "Support in the Specification for Claim Amendments", the present application teaches in detail how to locate the error-correcting parity symbols in the C1 and C2 codewords corresponding to an erroneous data symbol, and to produce disabled codewords by overwriting the appropriate parity symbols.

In particular, as claimed in amended claim 1, to make an uncorrectable error in a data symbol on a compact audio disc, it is necessary to disable *all* of the following:

the C1 codeword of the erroneous data symbol;

the C2 codeword of the erroneous data symbol; *and also*

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the C1 codewords of the erroneous C2 parity symbols introduced when disabling the C2 codeword.

In particular, the disabling of the second C1 codewords is a novel and non-obvious feature of the present invention. If all of the above-identified codewords are not properly disabled, the error-correcting machinery of the compact disc playback will simply correct the error in the original data symbol. Specifically, to produce an uncorrectable error, it is *not* sufficient merely to disable the parity symbols of the *frame* containing the erroneous data symbol, because the parity symbols of the frame are *not* the parity symbols of the *codewords* containing the erroneous data symbol.

The compact disc audio format was expressly designed to correct errors localized to the data frame level. In fact, an entire frame can be damaged and rendered unreadable without affecting the audio playback of the frame, because the codewords of the data symbols of the frame are spread out and distributed over a fairly large area of the disc. For an audio compact disc, *data error detection and correction is implemented at the codeword level, not at the frame level*.

This is why it is necessary to be able to locate and disable the C1 and C2 codewords in order to carry out the present invention. The present application discloses in detail a novel and inventive method of how to do this, and the limitations of amended claim 1 recite these features. Sinquin discloses only the frames as recorded on the compact disc and fails to disclose the codewords and therefore fails to disclose or reasonably suggest any of the above essential details.

The Applicant therefore respectfully submits that amended independent claim 1 is patentable over the art of record.

New independent claims 17 and 27 likewise recite similar novel and inventive features regarding disabled C1 and C2 codewords, and are also believed to be patentable over the art of record.

The remainder of the claims each depend directly or ultimately from amended independent claim 1 and new independent claim 17, and therefore are also believed to be allowable over the art of record.

In view of the foregoing amendments and remarks, the claims are believed to be in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Respectfully submitted,
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